ST MARY'S SCIENCE DEPARTMENT:

PHYSICS

H

GCSE PHYSICS **HOMEWORK BOOK**
TOPIC 3: MAINS ELECTRICITY
STUDENT BOOK

YOU MUST ANSWER ALL THREE SECTIONS IN EACH PART OF THE HOMEWORK TASKS

NAME	
CLASS	
TEACHER	
FORM	

TASK	MARK	GRADE
1		
2		
3		
4		
5		
OVERALL		

GCSE PHYSICS

YEAR 9

TOPIC 3

HOMEWORK SCHEDULE

Please use the following table to ensure each homework task is completed and submitted on time.

Carrying out these homework tasks can only increase your ability to gain a high grade in the GCSE examinations.

Failure to hand in work on time will lead to sanctions to complete this work.

Task	Submission Date	Completed?	On Time?
Task 1 Electricity Revision			
Task 2 Electrical Power			
Task 3 Electrical Energy			
Task 4 The National Grid			
Task 5 Static Charges			

SCIENCE DEPARTMENT MARKING CODE

ID = Insufficient detail in answer
W = Wrong understanding of science.
IR = Irrelevant information given.
V = This is too vague to get a mark.
AQ = Answer the question asked
R = Read the question/information
M = Maths mistake
BOD = Benefit of the doubt given.
E = Explain the answer further please.
U = Wrong units used.
SF = Wrong significant figures used.
SP = Wrong spelling of a technical term
SR = Same reason given twice.
A circle means this lost you marks
An underline means this gained you marks

IMPORTANT NOTE

All sections in each task must be **FULLY ATTEMPTED.**

If students fail to achieve an acceptable mark on each task, they will be made to carry out supervised intervention the following week.

Each week, intervention sessions will be provided to help assist with answering the questions in the homework booklet if students are struggling with the difficulty of the problems.

PLEASE READ

This homework booklet has made with custom selected examination questions and activities to assess your understanding in the concepts covered in class. This will increase your familiarity with the style of examination questions.

Carrying out these questions can only increase your ability to gain a high grade in the GCSE examination.

Thank you for your hard work in completing this book, and good luck.

Mr. Turnbull

TASK 1: ELECTRICITY REVISION

SPEC CHECK

Content	Achieved?
Most electrical appliances are connected to the mains using three-core cable. The insulation covering each wire is colour coded for easy identification: live wire – brown neutral wire – blue earth wire – green and yellow stripes. The live wire carries the alternating potential difference from the supply. The neutral wire completes the circuit. The earth wire is a safety wire to stop the appliance becoming live. The potential difference between the live wire and earth (0 V) is about 230 V. The neutral wire is at, or close to, earth potential (0 V). The earth wire is at 0 V, it only carries a current if there is a fault. Students should be able to explain: That a live wire may be dangerous even when a switch in the mains circuit is open. The dangers of providing any connection between the live wire and earth.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

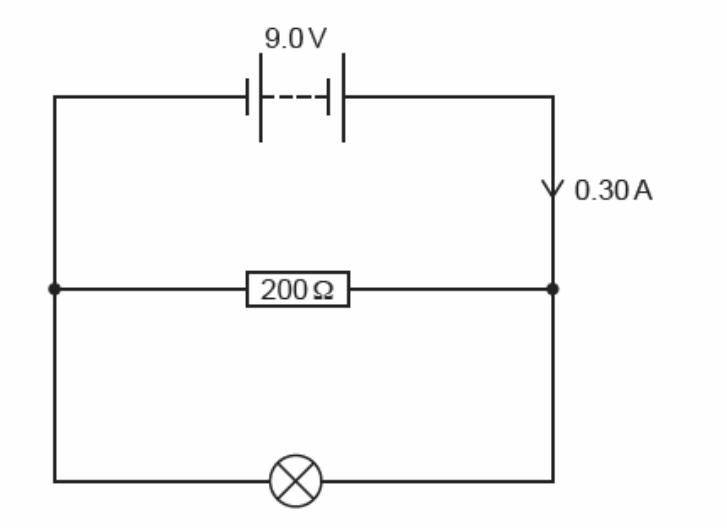
What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. A student connects a parallel circuit as shown below.



1.1 Calculate the current through the resistor.

[3 Marks]

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Answer: ..... A

1.2 Calculate the resistance of the lamp.

Give your answer to three significant figures.

[4 Marks]

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Answer: ..... Ω

1.3 The same lamp and same resistor are connected in a series circuit.

Describe how the current and resistance of the circuit change.

[2 Marks]

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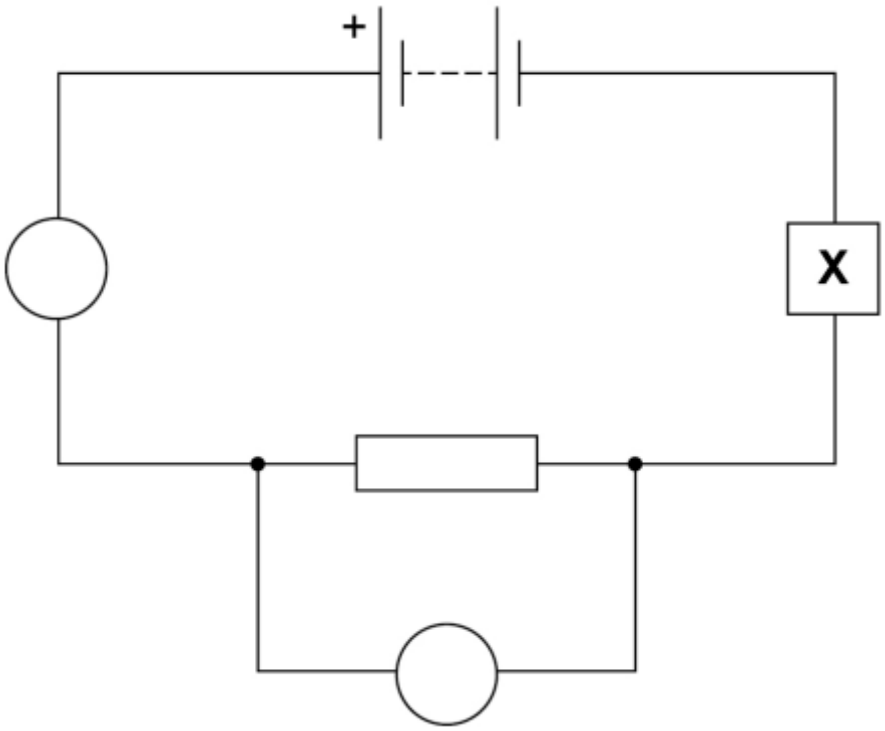
SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. A student investigated how the potential difference (p.d.) across a resistor varied with current.

Figure 3



1.1 Complete the circuit symbols for the meters the student used to measure the p.d. and current.

[1 mark]

1.2 Component **X** can be used to change the current in the circuit.

Which of the following would be most suitable to use as component **X**?

Tick **one** box.

[1 mark]

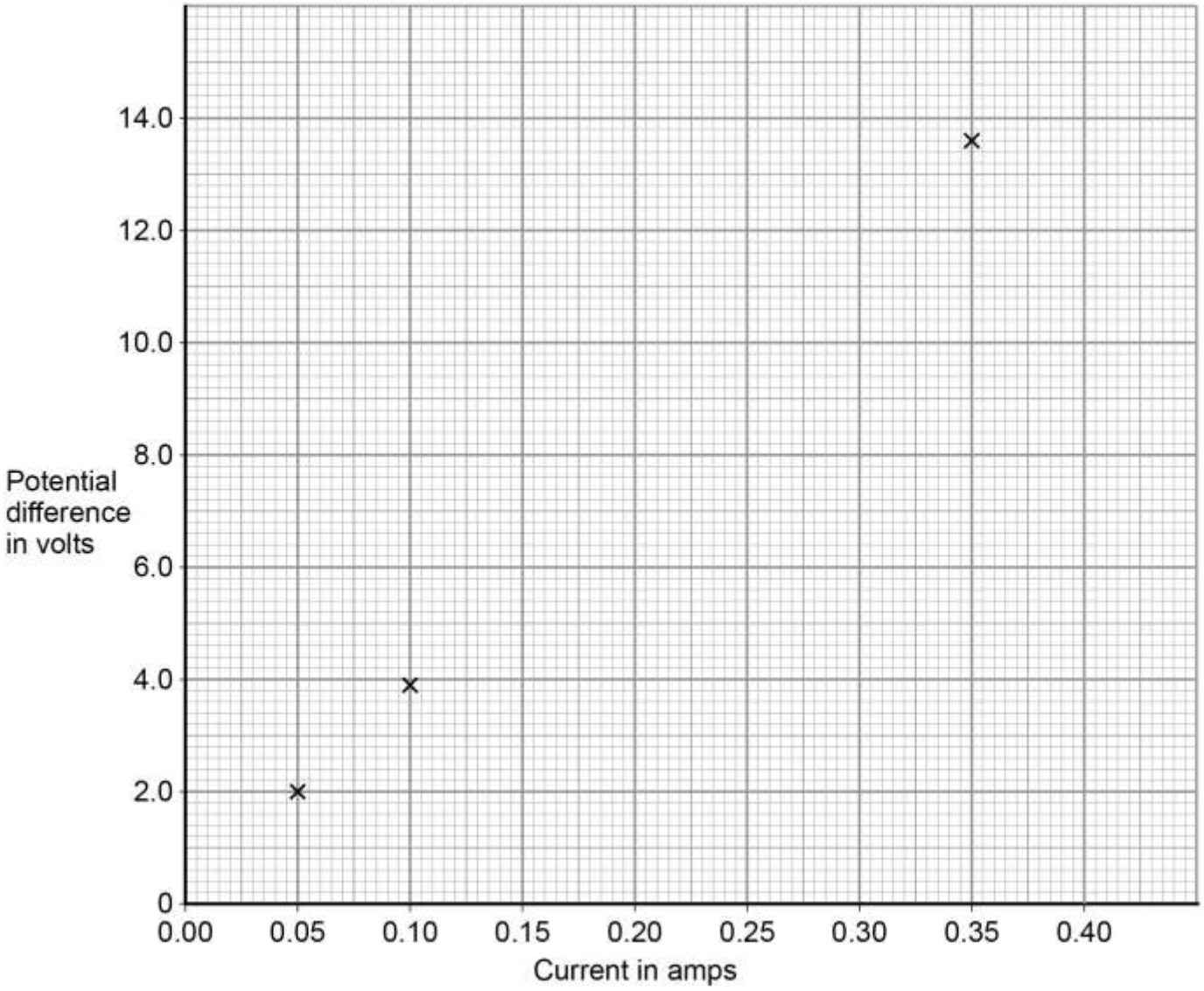
- Fuse ☐
- LDR ☐
- Thermistor ☐
- Variable resistor ☐

Table 1 shows the student's results.

Table 1

Current in amps	Potential difference in volts
0.05	2.0
0.10	3.9
0.15	6.1
0.20	7.8
0.25	10.1
0.30	12.0
0.35	13.6

Figure 4



1.3 Complete **Figure 4** using results from **Table 1**.

Three of the points have been plotted for you.

[2 marks]

1.4 Draw a line of best fit.

[1 mark]

1.5 Determine the resistance of the resistor when the p.d. across it is 5.0 V.

Give the unit.

Use the Physics Equations Sheet.

[4 marks]

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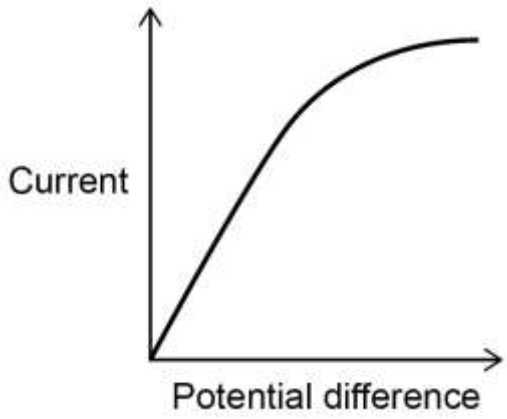
Resistance = ... Unit = ...

1.6 The student replaced the resistor with a different component and repeated the investigation.

A sketch graph of the results is shown in **Figure 5.**

Figure 5



Explain why the current and p.d. for this component vary as shown in **Figure 5.**

[4 marks]

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SECTION C

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1.1 Energy is transferred to consumers by the National Grid using an alternating potential difference.

What is meant by alternating potential difference?

[1 mark]

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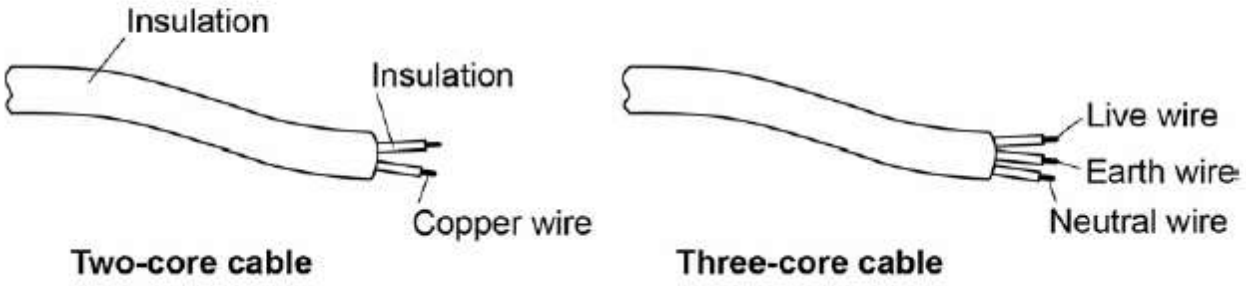
A clothes iron is a domestic appliance that is connected to the mains by a three-core cable.

Figure 2 shows a two-core cable and a three-core cable.

Figure 2



The different wires in each cable are covered with different colours of plastic insulation.

The live wire is covered in brown plastic insulation.

1.2 Why is it important that the live wire is always covered in the same colour of plastic insulation?

[1 mark]

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1.3 Explain why a clothes iron with a metal base must be connected to the mains by a three-core cable.

[2 marks]

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When the clothes iron is switched on the potential difference between the live wire and the neutral wire is 230 V.

1.4 Write down the equation that links current, potential difference and power.

[1 mark]

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1.5 The current in the live wire is 9.0 A.

Calculate the power of the clothes iron.

[2 marks]

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Power = ... W

FEEDBACK SHEET

Overall Mark:	**/29**	**GRADE ACHIEVED:**	
Section A:	/9	**9** ☐	**5** ☐
Section B:	/13	**8** ☐	**4** ☐
Section C:	/7	**7** ☐	**3** ☐
		6 ☐	**U** ☐

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision. ☐ Complete outstanding work. ☐ Make corrections as indicated by the teacher. ☐ Attend intervention for this topic ☐ Include more information in responses. ☐ Include more key words in responses. ☐ Attend departmental revision sessions. ☐ Read the questions carefully. ☐ Explain your answers in more detail. ☐ Carry out revision on Seneca Learning.	☐ Revise the equations. ☐ Check the units on answers. ☐ Check the correct amount of sig figs on answers. ☐ Check to convert values correctly. ☐ Show your full working out. ☐ Check your calculations. ☐ Revise the science investigative skills. ☐ Revise the key concepts of the topics. ☐ Thoroughly check your work for mistakes. Other:

Student response

TASK 2: ELECTRICAL POWER

SPEC CHECK

Content	Achieved?
Students should be able to explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time: power= potential difference × current P = V I power= current ^{2}× resistance P = I^2 R power, P, in watts, W potential difference, V, in volts, V current, I, in amperes, A (amp is acceptable for ampere) resistance, R, in ohms, Ω	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Which description shows no work being done?

Tick **one** box only.

[1 Mark]

A. cycling to school ⬭

B. eating a pizza ⬭

C. leaning against a wall ⬭

D. using an LED torch ⬭

2. A car travels at 54 km/hour.

What is the speed of the car?

Tick **one** box only.

[1 Mark]

A. 0.15 m/s ⬭

B. 1.5 m/s ⬭

C. 15 m/s ⬭

D. 150 m/s ⬭

3. Four students A, B, C and D are discussing power. Which student has a correct idea about power?

Tick **one** box only.

[1 Mark]

A. Power is how quickly charge flows.

B. Power is the energy used. ⬭

C. Power is the rate at which energy is transferred. ⬭

D. Power is the rate at which resistance increases. ⬭

4. Which correctly describes an electrical current? ⬭

[1 Mark]

Tick **one** box only.

A. Rate of flow of charge ⬭

B. Rate of flow of coulombs ⬭

C. Rate of flow of energy ⬭

D. Rate of flow of potential difference ⬭

5. Which situation provides 10 W of power?

Situation	Energy (J)	Time (s)
P	1200	120
Q	600	60

Tick **one** box only.

[1 Mark]

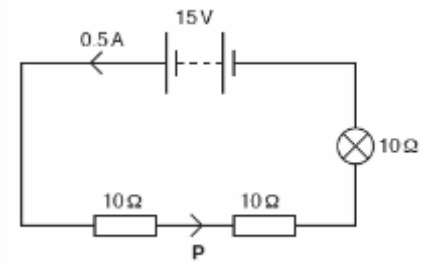
A. Neither **P** nor **Q** ⬭

B. Situation **P** only ⬭

C. Situation **Q** only ⬭

D. Situations **P** and **Q** ⬭

6. What is the current at point P in the circuit?



Tick **one** box only.

[1 Mark]

A. 0.5 A ⬭

B. 7.5 A ⬭

C. 15.0 A ⬭

D. 20.5 A ⬭

7. A student of weight W runs up a flight of stairs.

She moves a distance d metres horizontally and h metres vertically.

What is the work done against gravity running up the stairs?

Tick **one** box only.

[1 Mark]

A. W × d ⬭

B. W × h ⬭

C. (W × d) + (W × h) ⬭

D. W × (h/d) ⬭

8. A student measures the time it takes for the sound from a firework to reach the observer.

She takes 3 measurements of the time taken for four different distances, **A**, **B**, **C** and **D**.

Distance	Time taken (s)		
	1st measurement	2nd measurement	3rd measurement
A	2.16	2.19	2.17
B	1.99	2.02	1.97
C	1.80	1.81	1.89
D	1.69	1.68	1.71

Which distance **A**, **B**, **C** or **D**, has the largest range of values?

Circle the correct answer.

[1 Mark]

9. A pump lifts 500 kg of water to a water tank at the top of a building.

The water gains 240 000 J of gravitational potential energy.

The gravitational field strength is 10 N/kg.

Use the equation: Potential energy = Mass × Height × Gravitational field strength

Calculate the height of the water tank.

Tick **one** box only.

[1 Mark]

A. 4.8 m ⬭

B. 48 m ⬭

C. 240 m ⬭

D. 480 m ⬭

10. A gas fire, used to heat a room, has an input energy transfer of 180 000 J per minute.

The fire has an efficiency of 0.8.

Use the equation: Efficiency = Useful output energy transfer / Input energy transfer

Calculate the useful output energy transfer per minute.

Tick **one** box only.

[1 Mark]

A. 600 J ⬭

B. 2400 J ⬭

C. 36 000 J ⬭

D. 144 000 J ⬭

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 7 shows a person using an electric lawn mower.

Figure 7

1.1 The lawn mower is connected to the mains electricity supply.

What is the frequency of the mains electricity supply in the UK?

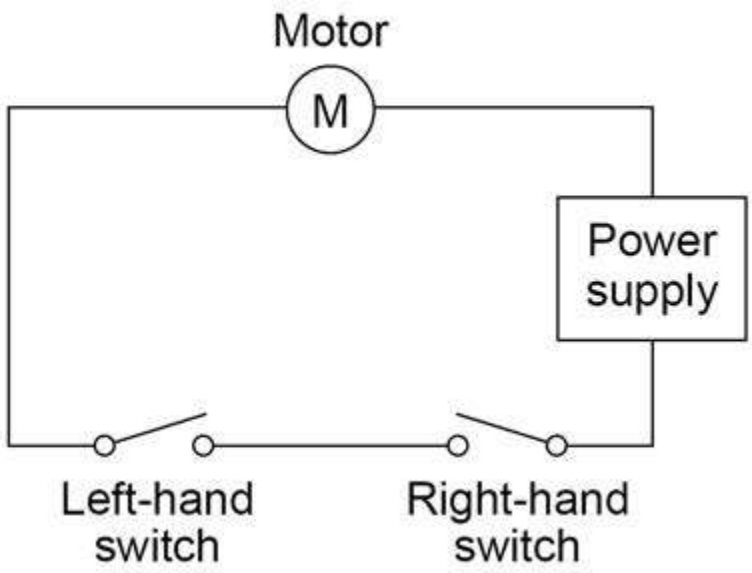
[2 marks]

Frequency =..... Unit: .....

The lawn mower has a switch on each side of the handle.

Figure 8 shows the circuit diagram for the lawn mower.

Figure 8



1.2 The motor in the lawn mower can only be turned on when the person using it holds the handle of the lawn mower with both hands.

Explain why.

[2 marks]

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1.3 The power input to the motor is 1.8 kW

The resistance of the motor is 32 Ω

Calculate the current in the motor.

[3 marks]

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Current = ... A

1.4 The useful power output from the motor is 1.5 kW

Calculate the time it takes for the motor to transfer 450 000 J of useful energy.

[3 marks]

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Time = ... seconds

SECTION C

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. An energy input of 1.3×10^{18} J is supplied each year by power stations to the National Grid.

Not all of this energy is supplied to consumers. Some of the energy is wasted in the distribution process.

1.1 Write the equation which links efficiency, total input energy transfer and useful output energy transfer.

[1 mark]

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1.2 The energy supplied each year to consumers is 1.2×10^{18} J

Calculate the efficiency of the distribution process.

[2 marks]

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.....

Efficiency = ...

1.3 How is electrical power transmitted across the National Grid to make the process as efficient as possible?

[1 mark]

Tick **one** box.

At a high potential difference and a high current	☐
At a high potential difference and a low current	☐
At a low potential difference and a high current	☐
At a low potential difference and a low current	☐

1.4 Write the equation which links energy transferred, power and time.

[1 mark]

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1.5 A wind turbine supplies a power output of 8000 kW for 1200 seconds.

Calculate the energy transferred by the wind turbine in kJ

[3 marks]

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Energy Transferred = ... kJ

1.6 Describe the environmental advantages and disadvantages of using wind turbines to generate electricity in the UK.

[4 marks]

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FEEDBACK SHEET

Overall Mark:	**/32**	**GRADE ACHIEVED:**	
Section A:	/10	**9** ☐	**5** ☐
Section B:	/10	**8** ☐	**4** ☐
Section C:	/12	**7** ☐	**3** ☐
		6 ☐	**U** ☐

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Student response

TASK 3: ELECTRICAL ENERGY

SPEC CHECK

Content	Achieved?
Everyday electrical appliances are designed to bring about energy transfers. The amount of energy an appliance transfers depends on how long the appliance is switched on for and the power of the appliance. Students should be able to describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices. Work is done when charge flows in a circuit. The amount of energy transferred by electrical work can be calculated using the equation: energy transferred = power× time E = P t energy transferred= charge flow × potential difference E = Q V energy transferred, E, in joules, J power, P, in watts, W time, t, in seconds, s charge flow, Q, in coulombs, C potential difference, V, in volts, V Students should be able to explain how the power of a circuit device is related to: The potential difference across it and the current through it The energy transferred over a given time. Students should be able to describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

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What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Which of the following is a definition for specific heat capacity in physics?

Tick **one** box only.

[1 Mark]

A. Energy needed to increase the temperature of 1 g of material by 1 °C. ⬭

B. Energy needed to increase the temperature of 1 kg of material by 1 °C. ⬭

C. Energy needed to increase the temperature of 1 g of material by 10 °C. ⬭

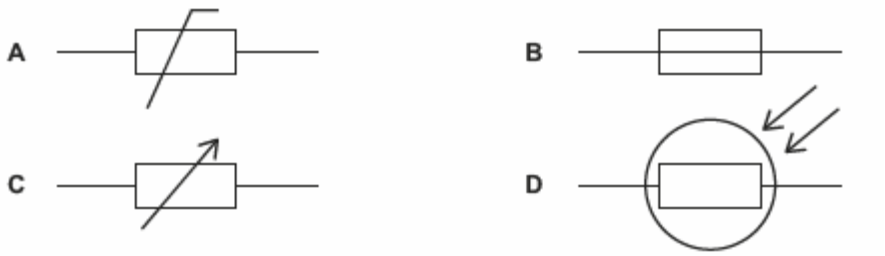
D. Energy needed to increase the temperature of 1 kg of material by 10 °C. ⬭

2. A student wishes to draw a diagram of a circuit she has created.

Which diagram **A**, **B**, **C** or **D** shows the circuit symbol for a variable resistor?

Circle the correct answer.

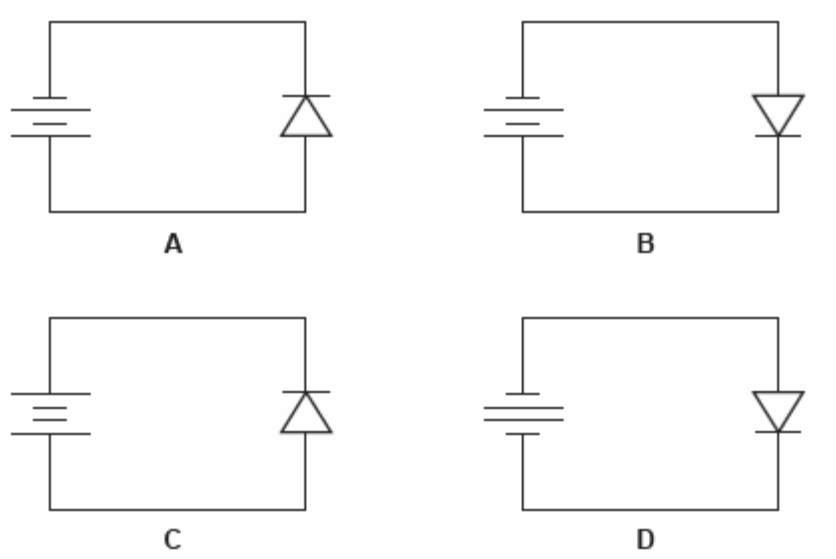
[1 Mark]



3. In which circuit would a current flow?

Circle the correct answer.

[1 Mark]



4. Which of the following is the same speed as 7.2 km / h?

Tick **one** box only.

[1 Mark]

A. 2.0 m / s ⬭

B. 20.0 m / s ⬭

C. 25.9 m / s ⬭

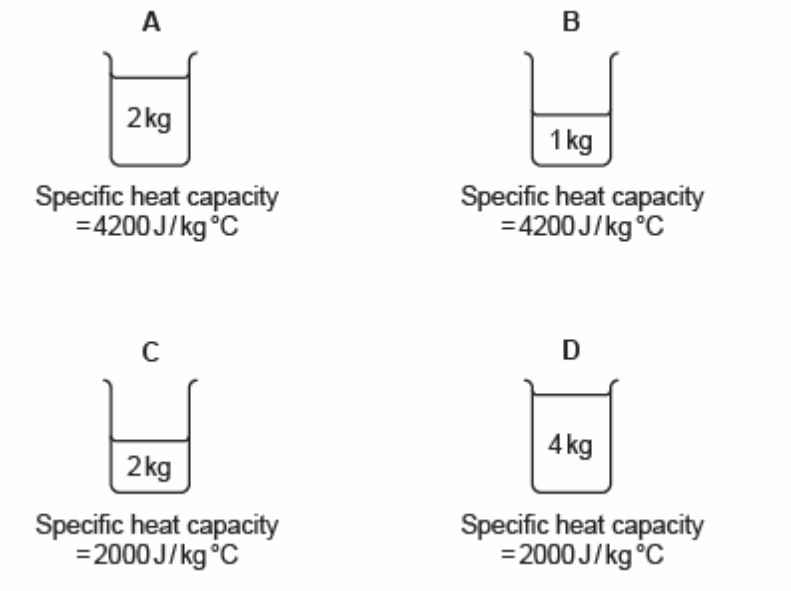
D. 120.0 m / s ⬭

5. A student is heating substances in four identical beakers **A**, **B**, **C** and **D**. Some information about the contents of the beakers is shown below.

Which beaker requires the greatest amount of energy to raise the temperature of its contents by 1 °C?

Circle the correct answer.

[1 Mark]



6. A student lifts four different objects onto a set of shelves.

Which object gains the most gravitational potential energy?

Circle the correct answer.

[1 Mark]

Object	Mass (kg)	Height lifted (m)
A	0.1	2.2
B	0.3	1.5
C	0.4	1.7
D	0.5	2.0

7. In the UK, three wires are used in the domestic electricity supply.

They are the earth wire, the live wire and the neutral wire.

Which sentence is correct?

Tick **one** box only.

[1 Mark]

A. The alternating p.d. between the neutral wire and the earth wire is 230 V. ⬭

B. The alternating p.d. between the neutral wire and the live wire is 230 V. ⬭

C. The earth wire contains a fuse for safety. ⬭

D. The live wire is connected to the case of an appliance for safety. ⬭

8. Which sentence describes a renewable energy source?

Tick **one** box only.

[1 Mark]

A. An energy source that can be replaced in your lifetime. ⬭

B. An energy source that cannot be used again and again. ⬭

C. An energy source that is not made from fossil fuels. ⬭

D. An energy source that will run out. ⬭

9. A car travels at 10 m / s. The mass of the car is 800 kg.

Calculate the kinetic energy of the car.

Tick **one** box only.

[1 Mark]

A. 4000 J ⬭

B. 8000 J ⬭

C. 40 000 J ⬭

D. 80 000 J ⬭

10. A driver stops a moving car by pressing the brakes. The engine is turned off and the driver gets out of the car. The driver returns to the car after 30 minutes.

Which sentence is correct?

Tick **one** box only.

[1 Mark]

A. The energy in the thermal store of the brakes increases. ⬭

B. The energy in the thermal store of the driver increases. ⬭

C. The energy in the thermal store of the surroundings increases. ⬭

D. The energy in the thermal store of the tyres increases. ⬭

SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. The circuit diagram shows a 50 W heater connected to a four-cell battery (**Figure 1**).

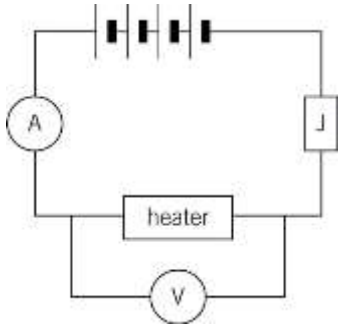


Figure 1

1.1 Calculate the potential difference of the battery. Each cell is 3.5 V.

[2 Marks]

.....

.....

Potential Difference: V

1.2 Calculate the current flowing through the heater.

[3 Marks]

.....

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.....

.....

Current: ..... A

1.3 Write down the equation that links energy transferred, power, and time.

[1 Mark]

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.....

1.4 Calculate the energy transferred to the heater when it is used for 10 minutes.

[3 Marks]

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.....

Energy Transferred: ..... J

1.5 A student investigated the energy being transferred using the joulemeter (J).
The reading on the joulemeter was always 20 J lower than the calculated value.
Name the type of error in the investigation.

[1 Mark]

.....

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SECTION C
This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. A light dependent resistor (LDR) is connected in a circuit.

1.1 Draw the circuit symbol for an LDR.

[1 mark]

1.2 A student investigated the relationship between current and potential difference for an LDR.

How should the student have connected the ammeter and voltmeter in the circuit?

[1 mark]

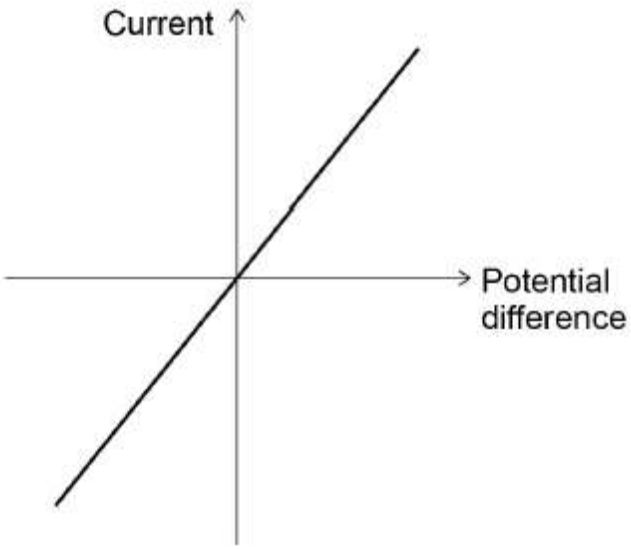
Tick **one** box.

Ammeter	Voltmeter	
in parallel with LDR	in parallel with LDR	☐
in parallel with LDR	in series with LDR	☐
in series with LDR	in parallel with LDR	☐
in series with LDR	in series with LDR	☐

Figure 1 shows a sketch graph of the student's results.

The LDR was in a constant bright light.

Figure 1



1.3 The student concluded that the current in the LDR is inversely proportional to the potential difference across the LDR.

Explain why the student's conclusion is incorrect.

[2 marks]

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1.4 The student repeated the investigation with the LDR in constant dark conditions.

Sketch on **Figure 1** the graph for the LDR in constant dark conditions.

[2 marks]

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The LDR was placed near a light source.

The following results were recorded:

Potential difference = 5.50 V

Current = 12.5 mA

1.5 Write down the equation that links current, potential difference and resistance.

[1 mark]

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1.6 Calculate the resistance of the LDR.

[4 marks]

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Resistance = ... Ω

FEEDBACK SHEET

Overall Mark:	**/31**	**GRADE ACHIEVED:**	
Section A:	/10	**9** ☐	**5** ☐
Section B:	/10	**8** ☐	**4** ☐
Section C:	/11	**7** ☐	**3** ☐
		6 ☐	**U** ☐

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision.	☐ Revise the equations.
☐ Complete outstanding work.	☐ Check the units on answers.
☐ Make corrections as indicated by the teacher.	☐ Check the correct amount of sig figs on answers.
☐ Attend intervention for this topic	☐ Check to convert values correctly.
☐ Include more information in responses.	☐ Show your full working out.
☐ Include more key words in responses.	☐ Check your calculations.
☐ Attend departmental revision sessions.	☐ Revise the science investigative skills.
☐ Read the questions carefully.	☐ Revise the key concepts of the topics.
☐ Explain your answers in more detail.	☐ Thoroughly check your work for mistakes.
☐ Carry out revision on Seneca Learning.	Other:

Student response

TASK 4: NATIONAL GRID

SPEC CHECK

Content	Achieved?
The National Grid is a system of cables and transformers linking power stations to consumers. Electrical power is transferred from power stations to consumers using the National Grid. Step-up transformers are used to increase the potential difference from the power station to the transmission cables then step-down transformers are used to decrease, to a much lower value, the potential difference for domestic use. Students should be able to explain why the National Grid system is an efficient way to transfer energy.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?

What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Figure 19 shows two electrical devices for heating water.

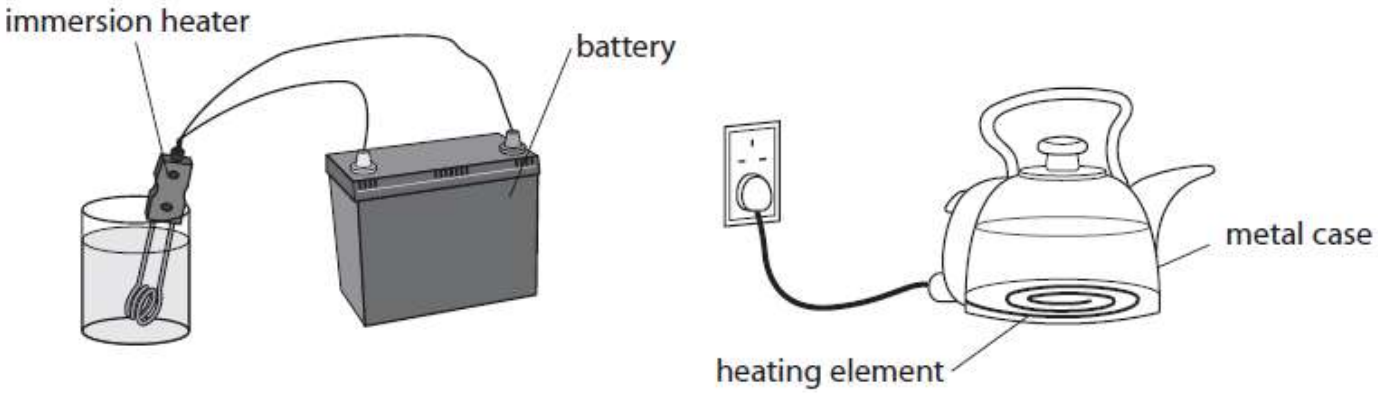

Figure 19

1.1 The current in the element of the immersion heater is 14 A.

The power of the immersion heater is 130 W.

Calculate the resistance of the immersion heater.

Give your answer to two significant figures.

[3 marks]

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Resistance of Immersion Heater = ... Ω

1.2 The current in the heating element of the kettle is 8.3 A.

State two differences between the movement of charge in the heating element of the kettle and the movement of charge in the immersion heater.

[2 Marks]

Difference **One**

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Difference **Two**

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1.3 Figure 20 shows the three-pin plug used to connect the kettle to the mains.

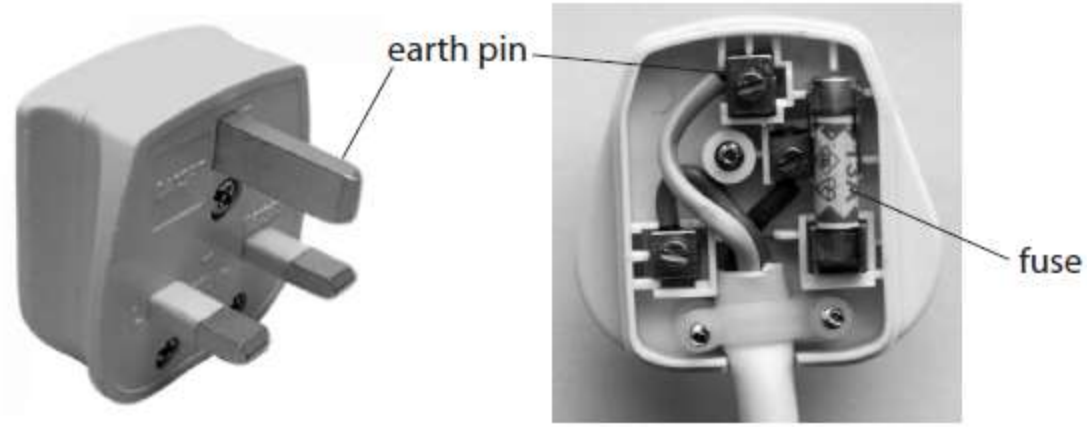

Figure 20

A fault occurs in the kettle causing the live wire to touch the metal case of the kettle.

Explain how the safety features of the plug operate when this fault occurs.

[6 marks]

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SECTION B

This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1.1 In the UK, electricity is delivered to consumers by the National Grid.
Explain the main features of the National Grid.

[6 marks]

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1.2 The National Grid supplied a house with 18 000 000 J of energy in 1 hour.
What was the average current supplied to the house during that hour?
Write any equations that you use.

[5 marks]

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Current = ...A

SECTION C
This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. The table shows some information about electrical appliances in the home.

Appliance	Power (W)	Current (A)	Resistance (Ω)
Electric drill	800	3.48	66.1
Iron	2000	8.69	26.5
Kettle	2500	10.86	21.1
Security light	500	2.17	105.8
Toaster	1650	7.17	32.1

1.1 Use the table to describe the relationship between power and resistance.

[1 Mark]

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1.2 Explain this relationship. Use ideas about resistance in your answer.

[2 Marks]

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1.3 The security light is switched on for 45 minutes every day for 7 days.
Calculate the energy transferred in kWh.
Give your answer to 2 significant figures.

[4 Marks]

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Answer = ... kWh

1.4 Explain the difference between direct potential difference and alternating potential difference.

[2 Marks]

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1.5 The electric drill does not need an earth wire.
Explain why.

[1 Mark]

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1.6 Mains electricity can be produced in a power station that burns coal.
An electric iron is plugged into the mains and switched on. The temperature of the iron increases.
Describe this process.
Use ideas about energy stores in your answer.

[3 Marks]

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FEEDBACK SHEET

Overall Mark:	**/35**	**GRADE ACHIEVED:**	
Section A:	/11	**9** ☐	**5** ☐
Section B:	/11	**8** ☐	**4** ☐
Section C:	/13	**7** ☐	**3** ☐
		6 ☐	**U** ☐

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

Strengths:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving
Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
Working:	Below	In line with	Above	**(your target)**
Effort:	Poor	Inconsistent	Good	Excellent

To improve further you need to:

☐ Carry out **independent** revision. ☐ Complete outstanding work. ☐ Make corrections as indicated by the teacher. ☐ Attend intervention for this topic ☐ Include more information in responses. ☐ Include more key words in responses. ☐ Attend departmental revision sessions. ☐ Read the questions carefully. ☐ Explain your answers in more detail. ☐ Carry out revision on Seneca Learning.	☐ Revise the equations. ☐ Check the units on answers. ☐ Check the correct amount of sig figs on answers. ☐ Check to convert values correctly. ☐ Show your full working out. ☐ Check your calculations. ☐ Revise the science investigative skills. ☐ Revise the key concepts of the topics. ☐ Thoroughly check your work for mistakes. Other:

Student response

TASK 5: STATIC CHARGES

SPEC CHECK

Content	Achieved?
When certain insulating materials are rubbed against each other they become electrically charged. Negatively charged electrons are rubbed off one material and on to the other. The material that gains electrons becomes negatively charged. The material that loses electrons is left with an equal positive charge. When two electrically charged objects are brought close together, they exert a force on each other. Two objects that carry the same type of charge repel. Two objects that carry different types of charge attract. Attraction and repulsion between two charged objects are examples of non-contact force. Students should be able to: Describe the production of static electricity, and sparking, by rubbing surfaces. Describe evidence that charged objects exert forces of attraction or repulsion on one another when not in contact. Explain how the transfer of electrons between objects can explain the phenomena of static electricity. A charged object creates an electric field around itself. The electric field is strongest close to the charged object. The further away from the charged object, the weaker the field. A second charged object placed in the field experiences a force. The force gets stronger as the distance between the objects decreases. Students should be able to: Draw the electric field pattern for an isolated charged sphere Explain the concept of an electric field Explain how the concept of an electric field helps to explain the noncontact force between charged objects as well as other electrostatic phenomena such as sparking.	

Target Setting

In this assessed piece of work, what target should I look to achieve in completing this task? Please refer to your marking feedback for your target.

From your previous work, fill in the following boxes with your personal progress in Physics.

What Topics Do I Know Well?	What Topics Do I Need to Revise?

SECTION A

This is a revision question on a previous topic.

You should aim to spend **10 minutes** answering this section.

1. Figure 11 shows a microwave oven. The microwave oven is connected to the mains supply.

Figure 11

1.1 The mains supply is alternating current.

What is meant by alternating current?

[1 mark]

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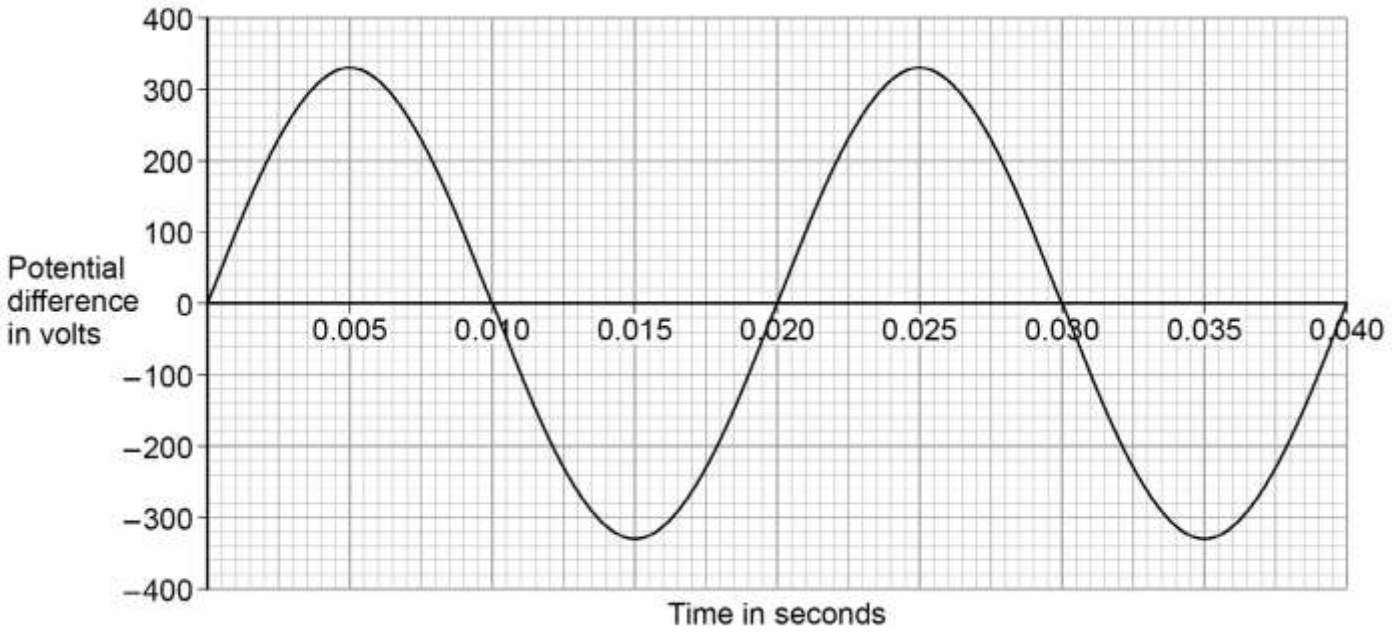
Figure 12 shows how the potential difference of the mains supply varies with time.

Figure 12



1.2 Determine the peak potential difference of the mains supply.

[1 mark]

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Peak Potential Difference = ... V

1.3 Determine the frequency of the mains supply.

Show your working.

[2 marks]

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Frequency = ... Hz

1.4 Figure 13 shows some information from the back of the microwave oven.

Figure 13

Input = 1200–1400 W
Output = 750–875 W

The efficiency of the microwave oven is constant.

Calculate the efficiency of the microwave oven.

Use the Physics Equations Sheet.

[2 marks]

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Efficiency =.....

1.5 The microwave oven has a metal casing.

Explain why it is important that the microwave oven is earthed.

[2 marks]

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Fuses and circuit breakers are safety features used in electrical systems.

1.6 Compare the use of circuit breakers and fuses in electrical systems.

[4 marks]

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SECTION B

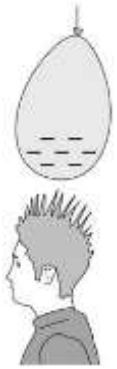
This is a question to revise understanding carried out in lesson.

You should aim to spend **10 minutes** answering this section.

1. Figure 12 shows a student after rubbing a balloon on his hair.

The balloon and hair have become charged.

Figure 12



1.1 Describe the force that acts on the student's hair in **Figure 12.**

[2 marks]

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1.2 An earthed conductor was brought near the charged student.

A spark jumped between the conductor and the student.

The potential difference between the conductor and the student was 2.5 kV

The energy transferred by the spark was 0.0050 J

Calculate the charge transferred by the spark.

[3 marks]

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Charge = ... C

1.3 A defibrillator can transfer a charge to regulate a person's heartbeat.

Figure 13 shows a defibrillator.

Figure 13

When the defibrillator is in use, a potential difference of 4800 V is applied across the person's chest.

A charge of 0.16 coulombs passes through the person's chest in 4.0 ms

Calculate the resistance of the person's chest.

[5 marks]

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Resistance = ... Ω

SECTION C

This is a challenge question to extend your understanding.

You should aim to spend **10 minutes** answering this section.

1. A student investigates electrostatic charges.

1.1 Describe how the student could charge a plastic rod.

[2 Marks]

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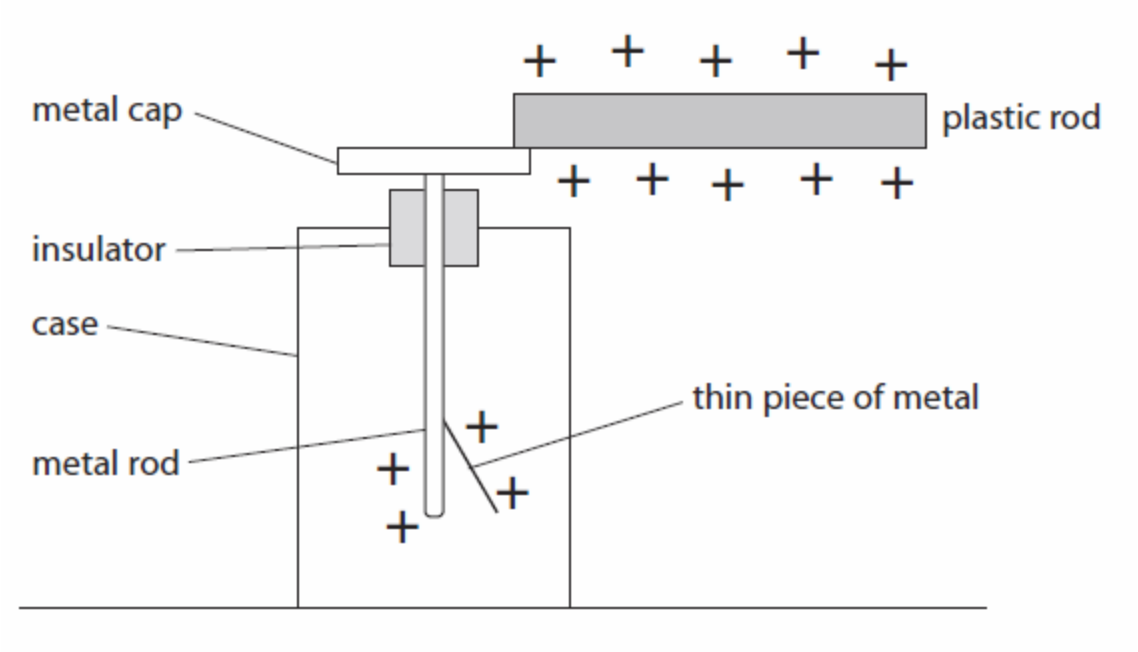
The student uses an electroscope. This piece of apparatus can be used to detect the presence of a charge.

The diagram shows the electroscope, which consists of a metal cap joined to a metal rod. The end of a thin piece of metal is attached to the metal rod. The student places the positively charged plastic rod onto the metal cap.

This causes the thin piece of metal to move away from the metal rod.



1.2 Explain why the thin piece of metal moves away from the metal rod.

[4 Marks]

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1.3 The student repeats the investigation using a negatively charged plastic rod instead of the positively charged plastic rod.

Explain whether the thin piece of metal still deflects from the metal rod.

[2 Marks]

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FEEDBACK SHEET

Overall Mark:	/30	**GRADE ACHIEVED:**	
Section A:	/12	**9** ☐	**5** ☐
Section B:	/10	**8** ☐	**4** ☐
Section C:	/8	**7** ☐	**3** ☐
		6 ☐	**U** ☐

Knowledge and understanding shown	Unsatisfactory	Satisfactory	Good	Outstanding

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Areas to Improve:	☐ Basic Knowledge of Concepts ☐ Quality of Written Communication ☐ Working Scientifically ☐ Answering Examination Questions ☐ Analytical Skills **Others** (Topic Specific)	☐ Applications of Concepts ☐ Mathematical Skills ☐ Experimental Technique ☐ Previous Topics ☐ Problem Solving

Progress:	Unsatisfactory	Satisfactory	Good	Outstanding
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Student response

EQUATIONS SHEET

AQA
Realising potential

GCSE Physics Equation Sheet

1	**pressure due to a column of liquid = height of column × density of liquid × gravitational field strength (g)**	$p = h \rho g$
2	(final velocity)^2 – (initial velocity)^2 = 2 × acceleration × distance	$v^2 - u^2 = 2 a s$
3	**force = change in momentum / time taken**	$F = \frac{m \Delta v}{\Delta t}$
4	elastic potential energy = 0.5 × spring constant × (extension)^2	$E_e = \frac{1}{2} k e^2$
5	change in thermal energy = mass × specific heat capacity × temperature change	$\Delta E = m c \Delta \theta$
6	period = 1 / frequency	
7	magnification = image height / object height	
8	**force on a conductor (at right angles to a magnetic field) carrying a current = magnetic flux density × current × length**	$F = B I l$
9	thermal energy for a change of state = mass × specific latent heat	$E = m L$
10	**potential difference across primary coil / potential difference across secondary coil = number of turns in primary coil / number of turns in secondary coil**	$\frac{V_p}{V_s} = \frac{n_p}{n_s}$
11	**potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil**	$V_s I_s = V_p I_p$
12	For gases: pressure × volume = constant	$p V = constant$

Acknowledgements

This document has been produced by Mr J Turnbull.

All relevant information has been credited in the document.

This document has been produced for educational purposes only.

This document has been produced for the AQA GCSE Science Specification.